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N 536 - Utilization of Nursing Research in Advanced Practice, Summer 2008

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Research Design

Contributors
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Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Increased Control with Design
Concepts Relevant to Research Design (1)

**Causality**

A \[\rightarrow\] B

Pressure \[\rightarrow\] Ulcer

**Multicausality**

Years smoking \[\rightarrow\] Heart disease

High fat diet \[\rightarrow\] Heart disease

Limited exercise \[\rightarrow\] Heart disease
Concepts Relevant to Research Design (2)

- Probability: Likelihood of an outcome
- Bias: Slanting findings
- Manipulation: Treatment
- Control: All phases of design
Design Validity

- Measure of accuracy of a study
- Examined with critique of the following dimensions:
  - Statistical conclusion validity
  - Internal validity
  - Construct validity
  - External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
• Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
Elements of a Strong Research Design (3)

- **Controlling the treatment**
  - Choose a treatment based on research and practice
  - Develop a protocol for implementation
  - Document the implemented treatment
  - Use a check-list to determine the extent of completeness to which the treatment was implemented
  - Evaluate the treatment during the study
Elements of a Strong Research Design (4)

- Controlling measurement
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
Controlling extraneous variables

- Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
- Random sampling
- Sample: Heterogenous, homogeneous, or matching
- Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Descriptive Design

Examining sequences across time?

- Yes
  - Following same subjects across time?
    - Yes
      - Single unit of study
    - No
      - Longitudinal Study
  - No
    - Cross-sectional design

One Group?

- Yes
  - Data collected across time
    - Yes
      - Repeated measures of each subject
      - No
        - Yes
          - Trend Analysis
          - No
            - Cross-sectional design
            - Descriptive Design

- No
  - Comparative Descriptive Design
A Typical Descriptive Design

Clarification → Measurement → Description → Interpretation

Phenomenon of Interest

Variable 1 → Description of Variable 1
Variable 2 → Description of Variable 2
Variable 3 → Description of Variable 3
Variable 4 → Description of Variable 4

Interpretation of Meaning

Development of Hypotheses
A Comparative Descriptive Design

Group I
:variables measured\}

Describe

Comparison of Groups on Selected Variables

Interpretation of Meaning

Development of Hypotheses

Group II
:variables measured\}

Describe
Selecting the Type of Correlational Design

Describe relationships between/among variables?

Predict relationships between/among variables?

Test theoretically proposed Relationships?

Descriptive correlational design

Predictive correlational design

Model testing design
A Descriptive Correlational Design

Measurement

Research Variable 1

Description of variable

Examination of Relationship

Description of variable

Interpretation of Meaning

Development of Hypotheses

Research Variable 2
A Predictive Design

\[ \text{Value of Intercept} + \text{Value of Independent Variable 1} + \text{Value of Independent Variable 2} = \text{Predicted Value of Dependent Variable} \]
Selecting The Type of Quasi-Experimental Design

Control Group?
  No
  Pretest?
    No
    One-group post-test only design
    Comparison with population values?
      No
      Suggest Reevaluating design
      One group pretest/post-test design
      Compare treatment & control conditions?
    Yes
    Repeated Measures?
      No
      Strategy for Comparison
      No
      Suggest Reevaluating design
      One group pretest/post-test design
      Compare treatment & control conditions?
    Yes
    Pretest?
      No
      One-group post-test only design
      Comparison with population values?
        No
        Suggest Reevaluating design
        One group pretest/post-test design
        Compare treatment & control conditions?
Selecting The Type of Experimental Design

Pretest

- No
  - Post-test only control group design
- Yes
  - Repeated Measurements?
    - No
      - Examine effects of confounding variables?
        - No
          - Multiple sites?
            - Pretest/post-test control group design
        - Yes
          - Blocking?
            - No
              - Randomized clinical trials
            - Yes
              - Comparison of multiple levels of treatment
                - No
                  - Examination of complex relationships among variables in relation to treatment
                - Yes
                  - Nested Designs

## Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>Randomly selected control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement of dependent variables</td>
<td>Measurement of dependent variables</td>
</tr>
<tr>
<td>Manipulation of independent variables</td>
<td></td>
</tr>
</tbody>
</table>

- **Pretest**: Measurement of dependent variables
- **Treatment**: Manipulation of independent variables
- **Post-test**: Measurement of dependent variables

**Treatment:** Under control of researcher

**Findings:**
- Comparison of pretest and post-test scores
- Comparison of experimental and control groups
- Comparison of pretest-post-test differences between samples

**Example:**
Your self (1990). The impact of group reminiscence counseling on a depressed elderly population.

**Uncontrolled threats to validity:**
- Testing
- Mortality

**Instrumentation**
- Restricted generalizability as control increases
# Post-Test-Only Control Group Design

<table>
<thead>
<tr>
<th>Measurement of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Randomly selected experimental group</strong></td>
<td><strong>TREATMENT</strong></td>
</tr>
<tr>
<td><strong>Randomly selected control group</strong></td>
<td><strong>POST-TEST</strong></td>
</tr>
</tbody>
</table>

- **Treatment:** Under control of researcher
- **Findings:** Comparison of experimental and control groups
- **Uncontrolled threats to validity:** Instrumentation, Mortality, Limited generalizability as control increases
## Pain Control Management

<table>
<thead>
<tr>
<th>Traditional care</th>
<th>Unit A</th>
<th>Unit B</th>
<th>Unit C</th>
<th>Unit D</th>
<th>Unit E</th>
<th>Unit F</th>
<th>Unit G</th>
<th>Unit H</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PRN Medication</th>
<th>Unit A</th>
<th>Unit B</th>
<th>Unit C</th>
<th>Unit D</th>
<th>Unit E</th>
<th>Unit F</th>
<th>Unit G</th>
<th>Unit H</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>New approach: “Around the clock” medication</th>
<th>Unit A</th>
<th>Unit B</th>
<th>Unit C</th>
<th>Unit D</th>
<th>Unit E</th>
<th>Unit F</th>
<th>Unit G</th>
<th>Unit H</th>
</tr>
</thead>
</table>

### Primary Nursing Care

<table>
<thead>
<tr>
<th>Primary Care</th>
<th>No Primary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit A</td>
<td>Unit B</td>
</tr>
<tr>
<td>Unit A</td>
<td>Unit B</td>
</tr>
</tbody>
</table>

### Research Design
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- More practical
  - Ease of implementation
- More feasible
  - Resources, subjects, time, setting
- More generalizable
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically

- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design